

JPRS 84415

27 September 1983

# Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

No. 204

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27 September 1983

# WORLDWIDE REPORT

## NUCLEAR DEVELOPMENT AND PROLIFERATION

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DUKOVANY POWER PLANT FUTURE PROGRESS DISCUSSED

Prague HORNÍK ENERGETIK in Czech 30 Jun 83 pp 8-9

[Article by Rudolf Unger: "Nuclear Power Plant Dukovany Yesterday, Today and Tomorrow"; passages enclosed in slantlines printed in boldface]

[Text] /The term "Nuclear Power Plant in Dukovany" has entered into the subconscious of our entire society over the past years of its construction. Almost every family knows that it is the largest power generation project ever undertaken in our history, because after launching into operation all of its four blocks, each with installed output capacity of 440 MW [megawatts], it will provide our national economy with a total of 1,760 MW into the interconnected power network which is no small contribution if we consider that, e.g., in December 1982 the overall load on our power distribution system was 11,259 MW. Moreover, the installation in Dukovany involves a nuclear power plant which with respect to the nature of the fuel it uses calls for special technological measures and special care for the safety of the operating personnel./

All great investment projects usually have their own particular fate, their own romantic biographies. Consequently, the construction project in Dukovany is a governmental undertaking of particular importance.

It would appear that a construction project of such significance would get everywhere "the green light," that no obstacles would stand in its way. However, life is usually more complicated. Nuclear power engineering is a brand new field of endeavor, both in construction and in operation. It represents something new for both builders and for producers of technology and their assembly personnel. In its scope, it represents a great impact on the qualifications of thousands of workers, be they suppliers in the logistical sphere or workers directly on the terrain at the construction site.

In Dukovany there is at work essentially no one who would have previously earned his "apprenticeship" in Jaslovské Bohunice, they are all starting here "from scratch," learning from the successes and failures. That applies equally to planners and designers, builders and metalworkers who transform projected plans into the billions of korunas in values of the new nuclear power plant.

/In these days the first half of 1983, meaning the first half of the Seventh 5-Year Plan, is coming to a close. Construction is lagging behind the original plan and new obligatory terms were stipulated in February of the current year for launching individual blocks into experimental operation:

- /--the first block is to be started up by the end of August 1984;
- /--the second block a year later;
- /--the third block by the end of May 1986; and
- /--the fourth block by the end of the same year.

/Among planners, builders and machinery suppliers/ it would take a score card to figure out who bears more responsibility for the delay, on whom the others "pulled a fast one." Nobody is without fault. Up to 1,100 various changes and additions were additionally tacked on to the project, a fact that could be taken as a proof of inadequate preparation of the project and, consequently as the cause of delays in construction operations. The planners could also be blamed for delays in installation of technological equipment, but it would not be the whole truth. In the initial years of construction, the work in Dukovany progressed at a very lukewarm rate and with small numbers of personnel, particularly if we consider that it involved only a single-shift operation between lunch on Monday and on Friday. For the remaining 3 days the site looked deserted. For some suppliers of technology, the builders' shortfall was entirely welcome, because it enabled them to cover up for their own lack of preparation for delivery and installation.

Nevertheless, in the case of a construction project so demanding on materials, labor and finances which Dukovany indubitably represents, comradely cooperation cannot be replaced by endless arbitration proceedings, because the new power generation capacity cannot be replaced by stacks of typed papers. The existing practice in Dukovany has shown that what the construction project needs most of all is operational decisionmaking directly at the site, without superfluous and time-consuming consultation about every little detail with superiors and with authorities hundreds of kilometers away.

Merger of the local unit of Energoinvest with the contracting organization into the single Dukovany Power Plant enterprise, undertaken at the outset of the current year, proved extremely beneficial specifically from the viewpoint of viability of operations. This proved to be of benefit to both the economic management and to trade union activities, as confirmed for us by the chairman of the ZV ROH [Plant Committee of the Revolutionary Trade Union Movement] of the k. p. EDU [concern enterprise Dukovany Power Plant], Josef Vojtasa.

Last year represented a significant step toward improvement. Builders met their quota for the year to 100.1 percent which, expressed in koruna, represents an accomplishment worth Kcs 1,075,000,000. In so doing, they also established their own record, because such a high value of construction operations was never achieved in past history at a single construction site.

From among the machinery suppliers active here at the present are teams from Sigma and Kralovopolski [machine building plants]; Chemont Brno is also starting to develop its operations. Welding operations on the primary system

are commencing here now and in the third quarter of the current year personnel from the Skoda enterprise will start installing the reactor.

/Construction on such a huge scale/ cannot do without explicit operational management. An operational group led by governmental commissioner Eng Frantisek Poukar is meeting for consultations weekly, but its workteams meet for coordination of operations daily. The managing staff under direct supervision by the governmental commissioner and the deputy minister of the Federal Ministry of Fuels and Energy, Eng Josef Keher, evaluates technical progress of the project monthly.

However, even during coordinative consultations among representatives of individual supplier enterprises there come to the fore at times old complaints and transgressions against "the rules of the game." Instead of statutory representatives with full decisionmaking power, some enterprises send to these consultations just rank-and-file officials without such power.

Construction of the nuclear power plant in Dukovany is not just a form of materialization of more than Kcs 3 million a day through construction organizations (and monitoring of time-graphs "with a sharp eye"), construction of the power plant also represents an unprecedented concentration of manpower on a relatively small area from various construction and machinery supplier organizations. At the present there are 9,000 people at work here, approximately two-thirds of them building and construction personnel who are already up to full strength and one-third technology installers. Once installation operations are in full swing, the overall number of personnel in Dukovany will increase further.

However, these people do not just work here, but because they come from the most varied reaches of the republic, they have to be housed somewhere over the week, they must have a place to change clothes, eat and have some means of transportation to reach their place of work from some of the more remote housing accommodations. And all this represents no negligible problem for the project investor, nor for the nearby district town of Trebic.

/Comments by the Chairman of the Czech Committee of our Trade Union Association, Jozef Flesko/

"The nuclear program, without a doubt, belongs among the key tasks of development, not only in the fuels and energy complex, but in the entire national economy. Launching of the 500 MW block in the Melnik power plant into operation marked the end of the era of construction of thermal power plants using solid fuels. Increments to primary energy sources will be provided in the coming years predominantly by construction of nuclear power plants.

"Construction of the nuclear power plant in Dukovany is undoubtedly the biggest investment project of the Seventh 5-Year Plan. On no other construction site in the entire history of the development of socialism in the CSSR were so many workers concentrated in one place as there are here. Comprehensive personal and social welfare is of extraordinary importance as

an integral part of the nuclear power plant construction. It involves creating of optimal social conditions for more than 12,000 workers of supplier organizations and of the future operator.

"These are the basic reasons that require our trade union to pay systematic attention to the progress of operations, to actively participate in developing work initiative, to deal with problems that inevitably crop up in the case of a construction project as demanding and complex as this one. The scope of construction, the complexity of conditions and of problems that were and are still coming up, they all call for close cooperation of all labor union members participating in the construction in Dukovany.

/"For that reason an agreement regarding a concerted effort to meet tasks in the course of the construction project was concluded as early as the beginning of 1981 between the Czech committee of our labor union association [CVOS] of workers in construction and in production of construction materials as well as the central committee of the trade union association of workers in the metalworking industry./

"The basis for this agreement is formed by close cooperation, keeping each other mutually informed about the meeting of goals and about problems which crop up and the approach to dealing with them, direct and regular contact between the leading officials of all three trade union associations and the construction site's trade union council, the site officials' work committee, participation in quarterly coordinative meetings of the chairmen of ZV ROH and, last but not least, mutual participation at meetings of the leadership of these organs in discussions regarding the situation at the nuclear power plant construction site.

"Much has been said and written about the Dukovany nuclear power plant, from shortfalls in construction, through the frequent changes in the project, to the problems encountered in billeting, boarding, providing facilities for changing and storing clothes, as well as transportation. Builders and technologists have often criticized the investor, who is a part of our trade union association, accusing him of primary blame for existing problems. In some cases the criticism was objective, but in many cases it was based on unfamiliarity with investment--objective problems.

"According to the original plan, the site during its peak period was to have 8,500 personnel. The shortfalls that occurred in construction, combined with specification of the final deadline for launching the first block of the nuclear power plant into operation by 31 August 1984, required that the site have up to 12,500 personnel during the peak period. It was no easy task to provide for the thus-increased numbers of personnel the requisite housing, boarding and facilities for changing and storing clothes in lockers. These demanding tasks in the social sphere are currently coped with successfully through extraordinary measures, expenses and inevitably temporary expedients.

"A certain share in coping with problems also goes to a concerted effort of all these associations, continuing care and assistance provided by the Czech Trade Union Council, mutual understanding with the investor and suppliers,

the prescribed program, procedures, systematic control of their implementation, but particularly it goes to the high initiative of workers on the site.

"A construction project as important, demanding and complex as is, without a doubt, the nuclear power plant in Dukovany, calls for a high degree of technical and organizational capabilities by planning and managerial personnel, for extraordinary efforts, for selfless devotion by workers and officials.

"I can say that many improvements have occurred at the site, which is borne out by the fact that in spite of existing problems and shortcomings there is constantly increasing activity, initiative of personnel, record-breaking performances by builders and technologists and a much deeper mutual understanding among participants in the construction project.

"Along with a manly handshake, we assured one another that through systematic and concerted efforts of the participating trade union associations we would contribute to meeting the prescribed deadlines, to the maximum satisfaction of all those who work on this site as well as of those who shall operate this giant project in the coming years."

/The chairman of the construction site trade union council in Dukovany, Josef Lutera, is an official who knows what is required of the ROH at the site, the limits of what is possible and where one could rely only on miracles. The site's trade union council has 23 members, primarily from the ranks of chairmen of plant and workshop committees and, in addition, it is aided by several special commissions. It coordinates the efforts of 5 plant committees and 25 workshop committees of the most varied economic supplier organizations of which there are currently 54 at the site. As can be seen from the difference in numbers, in Dukovany there are also organizations that still did not report to STOR [construction site trade union council]. For example, Sigma Lutín has 75 workers in Dukovany, but nobody knows anything about their trade union organization.

"We should spend most of our time at the site among the workers but, instead, we are mostly shuffling papers and dealing with problems that should be taken care of by administrative organs. But they cannot leave us indifferent and inactive, /because they directly concern the life of people/ on the site, caring for them," comments Comrade Lutera. "Some matters were neglected even in the social planning stage itself, such as opportunities for assembly to participate in cultural, social and political functions. And so, for the almost 10,000 workers at the site in Dukovany, all there is at their disposal in the district town of Trebic is one movie theater and a plant club which belongs to the Gustav Kliment Plants of Borovina.

"Otherwise, country inns within a distance of about 15 km must be used for meetings or cultural programs. When we add to the fees for guest performers the cost of renting the hall and buses for transporting visitors, we take out of the STOR [construction site trade union council] till up to Kcs 17,000, and our annual budget is Kcs 18,000. Since we staged 12 cultural programs last year, it can be deduced from this imbalance that the cultural life of their workers is also being subsidized by individual ZV ROH from their own

... from higher trade union organs. In this regard, it ... if some cultural institutions took Dukovany under ...

... provides not only for implementation of a unified plan of cultural ... for political and specialized schooling of trade union ... department of trade union training with the aid of the Czech ... Council. In the 1982/1983 school year, various forms of schooling ... attended by up to 300 officials--members of committees, commissions and ... stewards. However, not all trade union organizations at the ... advantage of this opportunity.

... encountered in coordination and cooperation are directly due to ... by higher association organs for their basic or workshop ... at the site. "It happens on trade union turf the same way it ... administrative," comments Comrade Lutera, "that, e.g., metal- ... some important dealings in Dukovany just some minor officials ... personnel without competence, while some decisions on some ... here and now."

#### Checkup Reveals?

... agreement about cooperation in investment construction among the ... energy, the central committee of the trade union association ... metalworking industry and the CVOS of employees in building and ... construction materials found specific manifestation by the end ... of the current year in the form of a checkup on implementation of ... resolutions from a consultation of central and territorial organs ... social problems attendant to the construction of the nuclear ... in Dukovany, which took place on 4 March of the current year.

... by representatives of all three trade union associations ... toward the most serious social problems, namely transportation ... facilities for changing clothes on the site, boarding and housing.

... found out that an additional 35 buses are needed to provide for ... /transportation of personnel from their quarters to the site and ... particularly to provide a boost for the lines between Dukovany and ... At the present time, this line commutes daily up to 4,000 workers ... at 2 locations in the district town. This situation is further ... by the fact that efforts at unifying working hours among workers ... individual contracting organizations has so far failed and that, e.g., ... and kindergartens in Trebic do not open until 7 am. In view of the ... situation in bus traffic, a need for just a half an hour's official ... in the administrative sector of EDU [electric power state Dukovany], ... in Trebic, turns into an undesirable all-day trip. The situation ... regard to delivery of 35 new buses, after intervention by the South ... Regional National Committee at the Karosa enterprise, appears to be ... so that by as early as late July they could start operating on the ...

/Weathered and perturbed at the site/ employees experience that it is a time-consuming and more difficult to deal with. The planned capacity of the canteen, operated by the Association of Nuclear Workers, no longer fully exceeded and cannot accommodate all boarders. In the first half of the year, it is why the noon break had to be extended to 90 minutes so that service, if at all, due to long lines, would not be done at the expense of working hours. Even so, it is possible to see at any time of the day, in the canteen, in the mess hall, the canteen and the grocery tens of workers standing in line for breakfast or beer, or on their way with bottled beer. If there were more vendors on the site, it could mean saving thousands of working hours a day, hours that are so directly needed here to meet the construction plan. What is more, even the schedule of hours for which the canteens and other facilities remain open does not meet the needs of the construction of jobs, but is rather convenient for the association's members. Even the site workers have critical comments on the variety of assortment of the food they eat.

However, these days there seems to be some hope for better times to come. At the end of June the personnel of the Dukovany Power Plant k.p. are to have their new mess hall, so that relief will be provided for the two existing mess halls. The new facility capable of boarding of up to 1,000 persons. If we consider that the power plant itself is now employing about 2,000 of its own personnel and 1,000 contractors, it becomes obvious that the capacity of the new mess hall was also underestimated in its basic concept. Another improvement is expected from modernization of kitchen equipment this summer and the addition of three sales booths.

The shop committee of the three trade union associations also assessed the current level of billeting and determined that while it became possible to increase housing not only for the existing number of personnel at the power plant site and even generate backup units for the expected increase in the number of technology installers, on the other hand, the quality of billeting in Trebic was adversely affected by conversion of double occupancy rooms into triple occupancy by the end of last year, a fact which found unfavorable response among "oldtimers." However, there is also no small number of cases where some workers, while formally registered for billeting, are paid a separation allowance while daily commuting to their families, whereby they shrink the billeting capacity for other personnel.

For a construction project as large and demanding as the Dukovany nuclear plant there will not be a carefree idyllic moment until the festive act of turning over of the fourth block; there will be constant need for dealing with important problems and bearing responsibility for the inevitable risks attendant to conduct of operations. Economic results for the first half of the current year show that the situation is improving, that things are also going well in solving, even though with considerable difficulties, the attendant social problems.

The course of everyday life in Dukovany up to now has also shown how important a role can be and is played here by trade unions when they systematically carry out all the social functions with which they were entrusted. The gates stand wide open for the selfless efforts of their members, for activity and work initiation.

END

001 5100/0008

# NUCLEAR COOPERATION BETWEEN CHILE, ARGENTINA RATIFIED

PY020131 Buenos Aires TELAM in Spanish 1550 GMT 1 Sep 83

[Text] Buenos Aires, 1 Sep (TELAM) -- Argentina and Chile today exchanged notes ratifying a bilateral agreement on peaceful uses of nuclear energy which was signed on 13 November 1976. The ceremony, which was held at the Golden Room of San Martin Palace, was attended by Argentine Foreign Minister Juan Ramon Aguirre Lanari and by former Chilean Ambassador to Argentina Sergio Onofre Jarpa Reyes.

Vice Admiral Carlos Castro Madero, chairman of the National Atomic Energy Commission, and officials of the Chilean mission also participated in the ceremony.

Aguirre Lanari, who made the first speech, referred to the importance of the agreement, which he described as another milestone in the fruitful job done by Ambassador Jarpa Reyes while serving as Chilean ambassador to Argentina. Aguirre Lanari also said that the agreement is proof that Chile and Argentina can shake hands in the nuclear field and that they want a future of brotherly peace and development.

For his part, Jarpa Reyes said that since the great gap between developed countries and Chile and Argentina is based mainly on the different levels of scientific and technological development, anything that means an improvement in the scientific and technological fields has good future prospects.

The now Chilean interior minister pointed out that small countries which are densely populated and have scarce geoeconomic resources have reached an outstanding position in the international sphere, because of their determination to become leaders in certain scientific and technical fields. He then noted that Argentina and Chile have vast resources, but if we do not use our know-how to create wealth, we will continue in the same place and the gap will widen. Jarpa Reyes voiced Chile's satisfaction over the place Argentina now occupies in the nuclear field and other important areas, and pointed out that this position envisages new advances for our entire region. At the same time, he made a call for cooperation, to establish a common front and share mutual confidence in order to frankly discuss the problems which may appear, with the purpose of consolidating independence, sovereignty, and the defense of our rights in the region. The former ambassador ended by pointing out that this was the last ceremony he was presiding over in his role as ambassador, and voiced his gratitude for the hospitality during his stay in the country.

At the end of a ceremony, and in response to some questions posed to him by journalists, Vice Admiral Castro Madero denied that Argentina's recent purchases of heavy water had any purpose other than to cover our needs in case of possible shortage, and stated that the rumors which were circulated in that regard only intended to create confusion in an activity which is carried out clearly and openly. Castro Madero said that Argentina's goals regarding the use of nuclear energy for peaceful purposes have been made quite clear, and at the same time he termed the U.S. endorsement for the purchase of heavy water from the FRG as positive.

INTER-AMERICAN AFFAIRS

ARGENTINE NUCLEAR OFFICIAL MEETS WITH CHILEAN PRESIDENT

PY191422 Buenos Aires TELAM in Spanish 1208 GMT 17 Sep 83

[Text] Santiago, 17 Sep (TELAM) -- Admiral Carlos Castro Madero, chairman of Argentina's National Atomic Energy Commission [CNEA], today was received by Chilean President Augusto Pinochet Ugarte in Santiago. Sources close to the Chilean Government have reported that the key matter discussed during the meeting was the bilateral cooperation agreement that will be signed in Santiago on 20 September.

Castro Madero and Pinochet also discussed cooperation and joint programs in the field of atomic energy. The agreement to be signed on 20 September will complement the agreement signed in November 1976 on cooperation in the field of peaceful uses of nuclear energy. This new agreement will specifically deal with the fuel cycle.

Yesterday, Castro Madero discussed technical matters with members of the Chilean Nuclear Energy Commission headed by General Herman Brady. Admiral Castro Madero will stay in Santiago until 21 September.

More on Castro Madero Visit

PY191250 Madrid EFE in Spanish 0238 GMT 18 Sep 83

[Excerpts] Santiago, 17 Sep (EFE) -- Admiral Carlos Castro Madero, chairman of Argentina's National Atomic Energy Commission [CNEA], has denied in Santiago the accusation made by THE NEW YORK TIMES to the effect that Argentina could be manufacturing nuclear weapons. Castro Madero stated that Argentina has never thought of using atomic energy for belligerent purposes because "the government has decided to carry out research and develop nuclear energy only for peaceful purposes."

Yesterday, after meeting with Chilean President Augusto Pinochet and Foreign Minister Miguel Schweitzer, Castro Madero held a roundtable meeting with members of the Chilean Nuclear Energy Commission headed by General Herman Brady. During this meeting, Castro Madero made the denial and insisted that Argentina is developing nuclear energy for peaceful purposes only. Castro Madero also remarked that the manufacture of atomic weapons by any Latin American country would prompt an arms race that would be detrimental to all the Latin American countries due to its high cost.

During the roundtable meeting, Admiral Castro Madero also stated that if any country attempted to develop atomic energy for belligerent purposes, the other countries would obviously adopt measures against it.

CSO: 5100/2091

## BRIEFS

BELO HORIZONTE TESTING LABORATORY--Work will begin shortly on the installation of the component testing laboratory in the Nuclear Technology Development Center of the Brazilian Nuclear Corporation (NUCLEBRAS) in Belo Horizonte. It is a laboratory without equal in the country and is intended mainly for testing valves of nuclear power stations under operational conditions identical to those that exist in the power station, according to information from NUCLEBRAS. The laboratory will also be qualified to conduct tests on various other components which will operate constantly inside the reactor. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Jul 83 p 26]

GEOLOGICAL PROSPECTING ACCORD--Brasilia--In Fortaleza, Mines and Energy Minister Cesar Cals is going to participate tomorrow in the signing of an agreement between NUCLEBRAS and the Ceara Mining Company (CEMINAS), the amount of which is still being negotiated, for geological investigation and mineral prospecting throughout the state. Tomorrow, the minister and the president of NUCLEBRAS, Dario Gomes, will visit the Itataia uranium deposit, the largest in the country with 124,500 tons of the ore and 150 kilometers from Fortaleza, where a pilot plant will be built to produce uranium concentrate. The beginning of construction of a plant in Itataia had been envisaged for this year but it was postponed indefinitely because of the cuts in NUCLEBRAS' investments. The plant project envisages a production of 50 tons of concentrate per year, representing only 10 percent of the production of the Pocos de Caldas plant which was opened for operation in Minas Gerais last year. This weekend, the minister will also visit the second largest uranium deposit in the country, Lagoa Real in Bahia, with 93,190 tons of the ore. Brazilian uranium reserves total 301,490 tons. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Aug 83 p 32]

ANGRA-III CONSTRUCTION PROJECT--Brasilia--The Andrade Gutierrez Company will begin preparatory work and excavations this week for the civil construction of the Angra-III nuclear plant in the state of Rio de Janeiro, NUCLEBRAS technicians revealed yesterday. The work will be carried out at a slow pace due to the 25-billion cruzeiro cut in NUCLEBRAS' investments, made in the last week of May, as well as to the "package," which among other things stipulated that the state companies can only authorize expenditures if supported by a purchase order, a service order or a binding note. Also because of the shortage of funds, NUCLEBRAS has postponed from this half year to mid-1984 public bids to contract for the civil works of the Iguape-I and II nuclear plants in Sao Paulo. The public bids for the Angra-III project were made last December, at which time

the [then] president of NUCLEBRAS, Paulo Nogueira Batista, named the Camargo Correa and Mendes Junion companies without public bids to execute the civil works of Iguape-I and II. [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Aug 83 p 34] 8711

CSO: 5100/2087

## NUCLEAR ENERGY REGULATION VIEWED AS CRUCIAL

Santiago LA NACION in Spanish 3 Aug 83 p 3

[Editorial: "Nuclear Energy"]

[Text] At an extraordinary session of the Government Junta, Herman Brady, minister and president of the Chilean Nuclear Energy Commission, stated that in order to ensure adequate development of nuclear energy the country would need appropriate legislation to regulate the various areas related to this activity. Minister Brady's statements were intended to provide more background to the Government Junta, which is now engaged in studying, in a committee of the whole, a draft law on nuclear security and protection against radiation.

The Chilean Nuclear Energy Commission is the administrative body charged with advising the government on all matters related to nuclear energy, both with regard to the study of laws and regulations and with regard to proposing programs for research, development, or exploration and production of atomic materials.

Considering the important task performed by this commission and taking into account its recommendations, the president of the republic has submitted for consideration a draft law which establishes standards for the regulation of activities related to the peaceful uses of nuclear energy.

It has been considered that the absence of such legislation is an obstacle to reconciling the desire to develop nuclear energy with the protection of people, property, and the environment. At the same time this lack of appropriate legislation has become an obstacle to the performance of the investigatory function of government which, in this context, means the Chilean Nuclear Energy Commission.

As this concerns a complex matter, new legal solutions have been proposed for regulating the field of nuclear energy or adapting to this area existing institutions of a more general character.

In any case regulatory standards should be oriented, as has been done in the draft legislation under consideration, toward the following objectives: ensuring the protection of the health, security, and preservation of people,

property, and the environment against the risks involved in the regular use of nuclear energy; preventing the improper appropriation or illicit use of nuclear energy, radioactive materials or ionizing radiation; setting up a system of financial compensation to pay for damages that might result; and watching over the implementation of the obligations which, in this area, are derived from international treaties to which Chile is a party.

At the international level there are many agreements in effect dealing with nuclear energy, among which the most important are the "Convention on Legal Responsibility Regarding Nuclear Energy," signed in Paris in 1960, which is in effect in the area of responsibility of the "European Nuclear Energy Organization"; and the "Vienna Convention on Legal Responsibility for Nuclear Accidents," which was negotiated in 1963.

The progress being made in Chile in the nuclear field requires the passage of legislation that is suited to the nature of this kind of activity. The completion of the efforts being made to pass this legislation will help to fill a vacuum. At the same time it will permit broader and more beneficial development of the policies now being applied.

5179

CSO: 5100/2086

BRIEFS

SAVAR NUCLEAR REACTOR--Major components of the nuclear research reactor now being built at Atomic Energy Research Establishment (AFRE) campus at Savar will arrive at Chittagong Port within a couple of days. This was stated by Dr Anwar Hossain, Chairman Bangladesh Atomic Energy Commission (BAEC) at the certificate distribution ceremony of a three-week training course on "radio-isotope in industry and hydrology" at Atomic Energy Centre, Dhaka, on Thursday. Dr Hossain said that the atomic reactor at Savar was expected to start functioning by the next year. The course was attended by engineers, scientists of different organisations. Explaining the importance of such a short training, the Chairman said this type of orientation course helps the transfer of knowledge between the participants and organisers. The function was addressed among others by Dr S.M.M.R Chowdhury Course director, Dr M.A. Rab Mollah, Director AECD, Dr Sanullah, course coordinator and three participants. [Text] [Dhaka THE BANGLADESH TIMES in English 19 Aug 83 p 1]

CSO: 5100/7149

## EFFORTS TO SET UP NUCLEAR POWER REGULATORY BOARD NOTED

## Proposal Under Study

Bombay THE TIMES OF INDIA in English 21 Aug 83 p 1

[Text] NEW DELHI, August 20. The Atomic Energy Commission is examining a proposal for the establishment of an authority for construction and operation of nuclear power and heavy water plants.

Such a separate authority was suggested by the Prasad committee which made a technical assessment of the frequent troubles at the Rajasthan atomic power station at KOTA.

The AEC has accepted the main recommendations of the Prasad committee and appointed another panel to recommend the structure and powers of the proposed authority. The Prasad committee has suggested that the proposed authority could even be a public-sector undertaking.

The Rajadhyaksha committee had also recommended the setting up of such an authority but the AEC did not favour the suggestion. It felt that the nuclear power stations and heavy water plants still required research and development support from other units of the atomic energy department and the existing arrangement was advantageous.

At least two members of the committee were concerned over the delay in the establishment of an independent regulatory organisation for enforcing safety standards for nuclear power stations.

## Satellite Launching

The official reply to the constutative committee indicates the hurdles that such a proposal has to cross. Since the activities of the department of atomic energy and the use of radiation sources in the country had increased, a committee was appointed to review the terms of reference and functions of the safety review committee.

The committee recommended the creation of an atomic energy regulatory board which would be reporting to the AEC.

The committee's report was accepted by the AEC which now appointed a "search committee for recommending the names of suitable persons who would be considered for the post of chairman of the regulatory board. The consultative committee was informed that the recommendations of the "search committee were under consideration.

The committee was told that it was necessary to develop nuclear energy to develop an installed capacity of 10,000 to 20,000 MW by the end of the century.

This was being taken up in three stages. The first stage pertained to uranium enrichment by employing modern techniques. The second stage related to pollution-depleted uranium fast breeder reactors and plutonium-thorium faster breeder reactors and the third stage was that of uranium-233 reactors.

Steps had been taken to improve the functioning of the existing heavy water plants and ensure high performance levels in plants which were in an advanced stage of commissioning.

The committee was informed that the third national satellite--INSAT-1C--was expected to be launched in late 1986.

The second generation satellites under the INSAT series will be totally indigenous. Work on it had already commenced and was expected to be completed by the first quarter of the next year. The first indigenous test and demonstration satellite was expected to be launched in late 1988.

In ocean development, the committee was told, the first samples of nickel and copper were now available. The department of ocean development has been promoting extraction of metals like nickel, copper and cobalt from manganese nodules found in large concentration in the Indian Ocean.

In 1990, India would be able to set up a pilot plant for extracting metal from nodules, it was told.

Addressing the committee, the Prime Minister stressed the need for public opinion in favour of improving and protecting the environment.

The said educative programmes on environment could be shown on TV which would shortly cover a broad section of our society.

Mrs. Gandhi said that she was very conscious of the need to protect flora and fauna and said efforts were being made in this direction.

She said that flora had to be preserved both for medicinal and food purposes. She pointed out that the problems of environment had to be seen in its totality and forest officials should be trained in such a way that they knew more about plants and flowers.

The Prime Minister and members of the consultative committee expressed their high appreciation to Mr. H. N. Sethna, the outgoing chairman of the Atomic

Energy Commission, for his dedicated services in the field of nuclear energy and excellent leadership to younger scientists.

The committee welcomed the appointment of Dr. Raja Ramanna as the new chairman of the AEC.

#### Delay Typical of DAE

Bombay THE TIMES OF INDIA in English 24 Aug 83 p 8

[Text]

The unnecessary delay and uncertainty that dog the proposal to set up a regulatory body for nuclear power are entirely typical of the working of the department of atomic energy (DAE). The department has again assured the consultative committee of parliament that it is considering the proposal. But there are hurdles in the way, the first being the report of a DAE committee set up to review its own, purely internal, safety review committee. The report recommended the establishment of an atomic energy regulatory board but also asked for a "search committee" to be set up to suggest candidates for the post of the chairman. The search committee's recommendations, the second hurdle, are now reportedly under the consideration of the Atomic Energy Commission. The procedure, involving as it does a good deal of to-ing- and fro-ing within the DAE, is not only dilatory; it has wholly obfuscated the core of the regulation issue and has moreover proceeded on the assumption that the regulatory board will report to the Atomic Energy Commission.

If such a board is constituted under the Commission's auspices, it will be but a faint and distorted shadow of an independent regulatory authority along the lines of the U.S. Nuclear Regulatory Commission or Britain's Nuclear Installations Inspectorate. The case for an independent body that licenses nuclear power installations, sets down engineering, personnel and environmental safety standards, and rigorously monitors them, is as strong as it is functional. This has been demonstrated time and again and particularly dramatically with the Three Mile Island accident in the U.S. in 1979. In principle, it is ludicrous for the operator of a nuclear installation to wield regulatory powers.

The DAE has in this respect been among the most anachronistic institutions of its genus in the world, combining the functions of designing, building and operating nuclear installations while also being their safety council. Its safety review committee has consisted of middle level DAE employees who could always be overruled by their superiors in the hierarchy. This will not change merely with the induction of a few outsiders into a board which reports to the DAE AEC. What is needed is an independent authority comprising different talents and interests, besides experts and scientists not in the DAE's employment. After all, the public has every right to scrutinise the working of a department whose gargantuan budget now equals half the plan outlay on the railways.

C30: 5100/7152

# FRAGEN HUNDLE FROM U.S. IN GETTING TARAPUR SPARES

Adras THE HINDU in English 22 Aug 83 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI Aug 21

Once again India has run into difficulties over the procurement of spare parts for the Tarapur atomic power plant, since West Germany and Italy have been advised by the U.S. to insist on stricter safeguards that would continue to be operative in one form or the other even after the expiry in 1993 of the 30-year Indo-American agreement.

This new development has perplexed India, since it had been generally assured after the visit of the American Secretary of State Mr. George Shultz, that the bulk of these spares would be supplied by West Germany and Italy under existing safeguards without any pursuit and perpetuity clauses, leaving only a few generic items to be provided by the U.S. through a Presidential waiver of the relevant provisions of the Nuclear Non-Proliferation Act.

**Bonn's assurance:** When the initial suggestion was made by the U.S. that some of the spares could be obtained from West Germany, Italy or Japan, India was given to understand that these parts would be made available within the framework of the 1963 agreement. Consequently, West Germany told India that it would be able to supply many of these items on the same terms that France had agreed to provide enriched uranium fuel for the Tarapur plant.

It was on the basis of this understanding that a West German team visited Tarapur to assess India's requirements and draw up a list of the spares which Bonn could provide with U.S. concurrence. But subsequently West Germany started insisting on stricter safeguards, over and above those already provided for in the 1963 agreement, in the shape of a general assurance by India about the continued applicability of these restrictions even after the expiry of this agreement.

**Additional safeguards:** The Government of India was told informally that the U.S. had asked West Germany to press for these additional safeguards since most of the spare parts to be supplied were on the trigger list of the London suppliers group making it almost mandatory for the member-countries to insist on

stricter conditions. As a result of this controversy, West Germany has not yet indicated which of the 30 odd items required by India would be supplied by it.

A similar hurdle has arisen in the case of Italy, which had also sent a team to India to assess the requirements of the Tarapur plant. It has also not specified yet how many of these spares could be provided from its stocks on mutually acceptable terms and conditions.

An Indian technical team is due to leave for West Germany and Italy, if it has not yet left already, to discuss the specifications and delivery schedules of the spares that these two countries are able to provide, but the political aspects have to be settled with them at Governmental level with U.S. concurrence. The U.S., meanwhile, is taking the stand that the question of its supply of the residual items would arise only after India has negotiated and finalised the arrangements for obtaining the bulk of the spares from West Germany and Italy and possibly Japan, although Tokyo is not inclined to offer any item on the trigger list.

**Parallel U.S. moves:** There have also been some parallel moves by Washington, in anticipation of the demand for some generic spares which are not available in West Germany, Italy or Japan. To obtain firm assurances from India on reprocessing and the continued applicability of safeguards on Tarapur even after the expiry of 1963 agreement. It has been informally suggested that such assurances would be extremely helpful in mollifying Congressional objections and clearing the way for the supply of the residual items through special authorisation by the President.

The net result of all these moves is that there is no certainty at all that West Germany and Italy are going to help India out without insisting on stiffer conditions. The U.S. itself continues to be as cagey as ever, determined to pressure and outmanoeuvre India into submitting to stricter safeguards, despite Mr. Shultz's assurances.

The Indian officials who have been handling these complex negotiations feel repeatedly let down by the U.S. to the point of losing their confidence in the good faith of the Reagan Administration. But they have not abandoned all hope of finding a way out, as was done in the case of fuel supply by France, because of the feeling that the U.S. may not push India into a corner to the point of compelling the country to shut down Tarapur rather than put up meekly with these humiliating pressures.

## FOREIGN SECRETARY SPEAKS AT DISARMAMENT CONFERENCE

Madras THE HINDU in English 25 Aug 83 p 11

[Text]

NEW DELHI Aug 24

India today made it clear that it would not accept a discriminatory system of international safeguards in the field of nuclear energy that excludes a few States from its purview.

"We are not prepared to accept an unequal and discriminatory system of safeguards for our nuclear energy programme," the Foreign Secretary, Mr. M. K. Rasgotra told the United Nations regional conference for world disarmament campy here.

India believed that nuclear exclusivity or nuclear monopoly in fact means nuclear anarchy on the part of a few nuclear weapon powers. By exempting the nuclear weapon powers from any scrutiny or control this discriminatory system is in fact helping promote the nuclear arms race among them," he said.

Mr. Rasgotra recalled the Indian proposal of 1966 for a freeze on nuclear weapons which would inter alia mean stoppage of their production combined with a cut off in production of fissionable material for weapons purposes.

In such an event all nuclear facilities everywhere would become peaceful and the nuclear weapons States would not have any reason or pretext for not accepting the same system of international safeguards which they were seeking to impose on non-nuclear weapon States like India even in relation to their peaceful civilian nuclear energy programme.

**Nuclear oppression:** Pointing out the many inherent dangers in such a policy of promoting and aggravating nuclear inequality, the Foreign Secretary said, "it is leading to nuclear arbitrariness it could result in nuclear oppression."

In any society only one set of laws could be made applicable to all. "We will not accept a system of international safeguards in the field of nuclear energy not applicable to a few States just because they chose to blend nuclear energy to weapons purposes before the cut off date prescribed in the non-proliferation treaty of January 1, 1967."

tion treaty of January 1, 1967.

Mr. Rasgotra said India had proposed in 1964 an end to all proliferation of nuclear weapons horizontal as well as vertical.

Reaffirming India's policy not to develop nuclear weapons, he said while exercising its sovereign national will to use nuclear energy for peaceful purposes only India was not prepared to accept an unequal and discriminatory system of safeguards.

Nuclear issues, he said, are too serious and too far reaching to be left to the two superpowers or the nuclear weapon States alone. The idea of some kind of a nuclear dictatorship was not acceptable.

Mr. Rasgotra also rejected the theories of deterrence as nothing more than rationalisations for the continued development, production, stockpiling and deployment of nuclear weapons.

A new brinkmanship is in evidence and from Europe, world peace is threatened by nuclear confrontation of unprecedented magnitude and proximity, he remarked.

Mr. Rasgotra called for strengthening international solidarity, combating chauvinism and desire to dominate all of which, he said, were major obstacles to world peace.

Inaugurating the five day conference on Monday the External Affairs Minister Mr. P. V. Narasimha Rao called upon the world community to pursue the goal of disarmament through arms limitation and not arms control.

Addressing the 60 participants from 20 countries, Mr. Rao said the struggle for disarmament in the nuclear age cannot be conducted on the basis of outmoded concepts.

In his welcome address the U.N. Under Secretary-General of Disarmament Mr. Jan. Mansson said a balanced pattern of global socio-economic development was inextricably linked to disarmament. — PTI & UPI

# DIFFERENCE IN U.S. TREATMENT OF INDIA, ARGENTINA NOTED

Adras THE HINDU in English 24 Aug 83 p 9

[Material]

(U)

THE CHARACTER OF the "non-proliferation" policy pursued by the United States stands interestingly exposed in the variance in its response to the immediate requirements of Argentina's nuclear power programme, on the one hand, and India's, on the other. In the case of Tarapur — which is covered by the 1963 agreement for bilateral cooperation that has the force of an international treaty as well as by a trilateral agreement involving the International Atomic Energy Agency — the enriched uranium fuel supply relationship was terminated unilaterally after several months of uncertainty. What India is experiencing today is a sticky and mostly obstructive approach to the issues involved in the supply of spare parts for the Tarapur reactors, even when the prospective supplier happens to be not the U.S., but a substitute nuclear exporter acting on American cue, such as West Germany, Italy or Japan. Having brought alternative sources of supply on the agenda, with respect to nuclear items no more controversial than safety-related spare parts for a pair of boiling water reactors already under IAEA safeguards, the U.S. is now apparently egging them on to ask for terms (notably the pursuit and perpetuity clauses to be smuggled in on account of the items supplied) that India refused to concede to Washington in the first place. The story continues to be a now-on, now-off guessing game and it has been dealt with and criticised again and again in the columns of THE HINDU. The best course for India to take under the circumstances might well be to liquidate the uneasy and tension-ridden remnant of a relationship in the field of nuclear commerce and to free its hands of all obligations and attendant restrictions. If it means closing down the Tarapur atomic power plant, that might not be a bad cost to pay to be rid of the problem and the unwelcome pressure on Indian nuclear policy.

Does not this contrast with the Reagan administration's clearance of the sale to Argentina of some 143 tonnes of heavy water produced by a West German company in the U.S., against opposition from elements within the Nuclear Regulatory Commission and the Congress? Like India, Argentina is a non-signatory to the Nuclear Non-Proliferation Treaty: it has also refused to sign the Treaty of Tlatelolco that is supposed to be the regional non-proliferation arrangement for Latin America. Like New Delhi, Buenos Aires has not acceded to a regime of full-scope safeguards, that is, external or IAEA safeguards and restrictions on the entire range of the country's nuclear programme. Argentina, in common with India, has shown an active interest in the research side of nuclear energy and is reported to be into the technology of peaceful nuclear experiments — although, unlike India, it has not reached the point of actually conducting a PNE. And yet two sets of standards, two divergent policies have been pursued with respect to supplying the peaceful nuclear power requirements of the two countries. If non-proliferation as a scheme of things is to have any meaning and credibility, it must apply to all countries — the nuclear-weapon haves and the havenots, the big and the small — without discrimination; it must also cover the "vertical" as much as the "horizontal" aspects of the proliferation of the menace of nuclear weaponry. Whatever difficulties and pressures it created for India, at least the non-proliferation stance of the Carter administration had a certain uniformity of approach and predictability — for example, in its tilt against enrichment and reprocessing transfers and also against the breeder programme, an orientation which was reflected in the American nuclear programme itself to an extent. If the Reaganites came to Washington with any philosophical approach to non-proliferation, it was a vague "supply-side", market incentives-oriented complaint that the previous (especially the preceding four-year) policy had brought an erosion in the U.S. share of international nuclear commerce. Thanks to the crudity of the practice under the Reagan administration, U.S. non-proliferation policy has lost all remnants of credibility and any claims to principle it might have possessed: because, on top of the well-entrenched club rules that segregate the nuclear weapon powers from the rest, there is an arbitrary — "national security" — related double dealing in nuclear commerce, as the cases of Argentina and India illustrate.

## INDIA RESISTS BID TO EASE IT OUT OF IAEA BOARD

Madras THE HINDU in English 21 Aug 83 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI, Aug. 20

Amidst its preoccupation with the Sri Lanka situation, India is faced with an unwelcome bid by the nuclear powers to deny this country its permanent place on the Board of Governors of the International Atomic Energy Agency (IAEA) under the guise of restoring China's seat after its impending admission.

The Government of India has launched a vigorous diplomatic drive to protest against this attempt and at the same time exert enough pressure on the big powers to either increase the strength of the permanent component of the IAEA board or else reduce the European over-representation to accommodate the deserving Asian nations.

The Board of Governors consists of two categories of members — globally advanced and regionally advanced countries with adequate nuclear knowledge to qualify for representation. Though in theory both the categories are elected by the 110 members of the IAEA, the first category is treated more or less as permanent members who by convention are unanimously re-elected, while those belonging to the other category of non-permanent members have to seek election to represent regions that are not adequately represented by the permanent members of the board.

**Freezing membership:** The Board of Governors initially consisted of nine permanent members and four non-permanent members, but after the expulsion of Taiwan the strength of the first category got reduced to eight. The nuclear powers who dominate the board want to keep both categories of membership frozen at the present level, with the result that an at-

tempt is being made to accommodate China as a permanent member after its admission by easing India out and asking it to get elected as a regionally advanced country in the normal course.

The eight permanent members at present are the United States, the Soviet Union, Britain, France, West Germany, Canada and India, with Italy and Belgium as alternates. The four non-permanent members are Australia, Japan and Egypt with Argentina and Brazil sharing the seat. In addition, there are what are known as elected seats and rotating seats for providing representation to other categories of nuclear countries that cannot claim to be either globally or regionally advanced in the field of nuclear development. The different categories of members are elected at the annual conferences of the IAEA on the basis of very complex criteria that have led to endless controversy through different interpretations.

**India fully qualified:** Though it is not a nuclear weapon power, India has made considerable progress in the peaceful uses of atomic energy to qualify for representation on the IAEA board as a globally advanced nation. It is in recognition of this progress that India has been elected to the board along with other permanent members from its very inception.

There could be no objection to China being brought in as a permanent member since it is a full-fledged nuclear power in its own right. It will in a sense be replacing Taiwan which was excluded from the IAEA as a logical follow-up of its expulsion from the U.N. to make way for the People's Republic of China's return to the world organisation.

The Government of India has reacted strongly against the move to allot its place to China on the Board in the name of keeping the number of perma-

ment members frozen at the present level without any justification for it. The Ministry of External Affairs has conveyed India's displeasure to the envoys of the permanent members, notably the U.S. and the Soviet Union, over this unjust move to deny this country its rightful representation.

**Regional imbalance:** There should be no difficulty, in India's view, in reverting to the earlier number of nine to accommodate China, whose place was unjustly allotted to Taiwan in the past. If the intention is to keep the number frozen at eight for whatever reason, then the present regional imbalance in the representation of globally advanced countries should be redressed by dropping some of them from Europe, since as many as four of the eight permanent members at present are from this one continent.

The Director-General of the IAEA, Dr. Hans Blix, has discussed with the Chinese leaders the procedures for China's admission and its election to the Board of Governors as one of the permanent members of it. But it is not known whether China is aware of the insidious attempt being made to exclude India as a permanent member to accommodate it.

It is India's hope and expectation that the authors of the move will realise this folly in good time and avert an ugly controversy at the annual meetings of the IAEA next month when the question of China's admission will come up for formal approval along with the proposal for conferring the status of a globally advanced power on it. The Government is putting up a stiff fight to forestall the move to exclude India from this charmed circle under the totally untenable pretext of accommodating China at its expense.

CSO: 5100/7150

GANDHI: NO CLAUSE ON NONPROCESSING SPENT FUEL

Calcutta THE STATESMAN in English 25 Aug 83 p 7

[Text]

NEW DELHI, Aug. 24. Mrs. Gandhi today denied in the Lok Sabha that the contract with the USA for fuel supply for the Tarapur reactors until 1988 contained a clause on non-processing of spent fuel, reports PTL.

She gave this information in a written answer to Mr George Fernandez.

She denied that the Prasad Committee, constituted to study the technical problems of the Rajasthan atomic power plant, had said the failure of the turbine blade was caused by non-utilization of the full capacity.

She said the U.S. Government, "in our view", had an obligation to permit the supply of spare parts for the Tarapur atomic power station.

She told Mr Madhav Rao Scindia in a written reply that the obligation was under the 1963 Indo-U.S. agreement on cooperation in civil uses of atomic energy.

Mrs. Gandhi said the Government's attention had been drawn to Press reports about statements by U.S. officials that the Tarapur reactors had sprung serious radiation leaks because of the lack of spare parts.

Mr M. Rasgotra, Foreign Secretary, told the Regional Conference for World Disarmament here that India could not accept a discriminatory system of international safeguards in nuclear energy that excluded a few States from its purview.

"We are not prepared to accept an unequal and discriminatory system of safeguards for our nuclear energy programme", he said.

India believed that "nuclear exclusivity or nuclear monopoly in fact means nuclear anarchy on the part of a few nuclear weapon powers, by exempting the nuclear weapon powers from any scrutiny or control this discriminatory system is in fact helping promote the nuclear arms race among them," he said.

CSO: 5100/7154

## BRIEFS

NUCLEAR POWER GENERATION--New Delhi, August 17 (PTI)--Nuclear power generation during the first quarter of 1983-84 was about 380 million units short of the fixed target, the Prime Minister, Mrs Indira Gandhi informed the Lok Sabha today. In a written reply to Mr Ravindra Varma and Motibhai Chaudhari, the Prime Minister said the shortfall was due to the extension of the refuelling outage of unit one of Tarapur Atomic Power Station and the long outage of unit one of Rajasthan Atomic Power Station (RAPS). The long outage in RAPS was caused by the light water leak from one of the end shields. During the period, 758.13 million units of nuclear power was generated as against the target of 1,140 million units, Mrs Gandhi said. She also clarified that none of the atomic power plants would be closed. In a written reply to a question by Mr S. Chakraborty, Mrs Gandhi said the repair work of the unit one of RAPS was in progress and efforts were being made to bring the unit back on line as early as possible. Unit two of RAPS is operating satisfactorily at present, she said. Mrs Gandhi also informed Mr Niren Ghosh in a written reply that the rate of sale of power from TAPS and RAPS is currently 23.23 paisa per kwh and 31.34 paisa per kwh respectively. Nuclear power is competitive vis-a-vis coal based thermal power at distances of 800 km and more from the pithead, she said. [Text] [Bombay THE TIMES OF INDIA in English 18 Aug 83 p 7]

NEW AEC CHIEF--New Delhi, August 6--Dr Raja Ramanna, eminent nuclear physicist, has been appointed chairman of the Atomic Energy Commission and secretary, department of atomic energy. He succeeds Dr H.N. Sethna, who is retiring. Dr Ramanna is currently secretary in the department and a member of the commission. He was specially charged with the responsibility of research and with his accepting the new assignment, the department will have to find someone to take charge of Bhabha Atomic Research Centre. Dr Ramanna had earlier worked as the scientific adviser to the defence minister, an assignment which was given to him by the Janata government which shifted him from the atomic energy department. [Text] [Bombay THE TIMES OF INDIA in English 7 Aug 83 p 1]

CSO: 5100/7143

# SCIENTISTS SAID 'FORGING AHEAD' ON NUCLEAR RESEARCH

Lagos DAILY TIMES in English 12 Aug 83 p 7

[Article by Remi Olayiwola]

[Text]

**W**HILE the debate on whether Nigeria should go nuclear or not rages on within the society, Nigerian scientists and researchers seem to be forging ahead on the crucial issue.

This is borne out of the fact that the recently concluded International Conference on Energy held at the University of Ife, Ile-Ife produced meaningful dialogue on this crucial issue.

The four-day conference had the theme of its discourse as, "The Role and Potentials of Nuclear Energy in Nigeria." Various ideas on aspects of nuclear energy were discussed among policy makers, international energy experts and Nigerian scientists.

One area touched at the conference which is of crucial importance to all was centred on political and policy issues involved with nuclear energy. In fact, the conference centre was held spell bound when three eminent scholars took part in an educative and illuminating debate.

The men included a one-time Secretary General of the Organisation of Petroleum Exporting Countries (OPEC), Chief M. O. Feyide, Senator David Oke and the Head of Department of International Relations at the University, Dr. R. O. Onwuka.

In his contribution, Chief Feyide advised the policy makers that while nuclear energy has good potential to play an important role

in our energy system, we should make haste slowly and avoid rushing into the purchase and installation of nuclear power plants.

He believes that this should be left until such a time when we have clearly defined our national objectives and thoroughly discussed the issues involved and the strategies we shall pursue in the context of our human, technical and financial resources.

On the purchase of equipments, Chief Feyide advised that our country should not allow itself to be talked into the premature purchase of second-hand equipments or unsuitable technology.

In his own contribution, Dr. Onwuka said the demand for energy in the country within the last five years has increased by more than 700 per cent. He was of the opinion that per capita consumption of energy could be regarded as a level of development.

Senator David Oke created some fun among the participants when he disclosed to them that he was an "illiterate" on energy matters until sometime last year when he was "lectured" by two university professors one of whom included Professor A. F. Oluwole.

He charged scientists and researchers to refresh the minds of politicians anytime they fail to show enough enthusiasm.

## NIGERIA

### BRIEFS

**LOAN TO URANIUM FIRM**--The Federal Government has agreed to guarantee a loan of 25 million Naira to enable the Nigerian Uranium Mining Company to continue with its activities, the Minister of Mines and Power, Alhaji Mohammed Hassan, said in Lagos on Thursday. This followed the Federal Government's approval for the continuation of Uranium exploration by the company for the next three years, according to the minister. The bulk of work during this period would entail drilling in defined areas and exploration in other areas. The company is expected to build its headquarters in Gombe, Bauchi State, and carry out field activities in Mika, Gumchi, Goburunde, Gombe and Kaltungo. Other places earmarked for uranium exploration are the Ugep area in the Cross River and the Middle-Belt. The company, incorporated in 1978, has been exploring for uranium in the north-eastern part of the country covering parts of Bauchi, Borno and Gongola states. [Excerpt] [Kaduna NEW NIGERIAN in English 20 Jul 83 p 20]

**URANIUM PROSPECTS**--The Federal government has agreed to guarantee a loan of N25m. to enable the Nigerian Uranium Mining Company to continue with its activities, the minister of mines and power, Alhaji Mohammed Hassan, said in Lagos recently. This followed the Federal government's approval of the company's plans for the next three years, according to the minister, the bulk of work during this period would entail drilling in defined areas and exploration in other areas. The company is expected to build its headquarters in Gombe, Bauchi State, and carry out field activities in Mika, Gumchi, Goburunde, Gombe and Kaltungo. Other places earmarked for uranium exploration are the Uger area in the Cross River and the middle-belt. The company, incorporated in 1978, has been exploring for uranium in the north-eastern part of the country covering parts of Bauchi, Borno and Gongola states. [Text] [London WEST AFRICA in English 15 Aug 83 No 3444, pp 1900-1901]

CSO: 5100/55

SWEDEN REFUSES DANISH REQUEST TO HALT NUCLEAR WASTE SHIP

Complaints Followed Ship's Grounding

Stockholm: DAGENS NYHETER in Swedish 24 Aug 83 p 6

[Text] Sweden will not agree to the Danish demand to halt the nuclear waste ship, "Sigyn."

Energy Minister Birgitta Dahl said this at a press conference in Stockholm on Tuesday with the Danish environmental minister, Christian Christiansen.

The two ministers had met to discuss "Sigyn," but after the meeting they stated that they were not in agreement on the vessel's operation.

The Danes think that there are many questions of safety, while the Swedish opinion is that the transports are quite safe.

The Swedish position, which was presented with great emphasis by Birgitta Dahl at the press conference, is that the "Sigyn" has been approved by the Board of Shipping and that the government cannot put itself above the decision of an authority.

Important Principle

"It is a very important principle in Sweden," Dahl said, "not to step in against the authorities. This is particularly important in matters of safety and in matters that have to do with private rights."

In the past, Denmark had not had any serious complaints about the "Sigyn's" transportation of nuclear material over Danish waters. But after the vessel ran aground in Barsebacks harbor in November 1982, one became worried.

The grounding led to an investigation by the government's commission of inquiry, which raised a series of questions about the "Sigyn's" maneuverability. Among other things, it was not clear how the ship would react in strong winds in the open sea.

"Calm impossible"

"All we are asking for is a special investigation of the "Sigyn's" seaworthability," the Danish environmental minister, Christian Christensen, said at the press conference.

"But the Swedes refuse and say that we should be calm. But how can one ask us to be calm? After all, this is a matter of transportation of the world's most dangerous material in a ship that acts differently from all others."

The two ministers could not see any other way of settling the dispute than continued negotiations.

But with mutual irony both Dahl and Christensen pointed out that no one profits from creating conflicts, and that it is important to resolve conflicts by agreement.

[Text]

There may have been tacit allusions to the oil quarrel in the Kattegatt and the respective desires of the countries to negotiate or not to negotiate, but both Christensen and Dahl denied that the argument about the "Sigyn" had anything to do with the border quarrel.

#### Swedish Paper Comments

Stockholm DAGENS NYHETER in Swedish 25 Aug 83 p 2

[Editorial]

[Text] Birgitta Dahl said after a conference in Stockholm with the Danish environmental minister, Christian Christensen, that the "Sigyn's" transportation over Danish waters of highly radioactive nuclear waste cannot possibly be stopped. This after the Board of Shipping said that the "Sigyn" has no difficulties in maneuvering in a calm sea; it would therefore be a violation of private rights (read: those of the Swedish Nuclear Fuel Supply and of the nuclear industry) if the transportation should be stopped.

If the Danes are afraid that the "Sigyn" is not sufficiently seaworthy in the face of danger in rough seas, this has nothing to do with the case, because this question was not part of the commission the Board of Shipping and the government's commission of inquiry had to deal with after the grounding in Barreback's harbor. Abacadabra!

This reasoning has the same weight in principle as when the energy minister said in her press conference 5 January, when the all clear signal was given for the "Sigyn" transports, that it would be impossible to break the agreement between SKBF and the French development firm, Cogema. Why impossible? Of course the agreement was made, and agreements should be kept; if Sweden breaks an agreement, it would undermine the basic values of international law,

and how would this affect our peacekeeping efforts in the world?

Therefore, if the "Sigyn" cannot continue to sail and possibly to run aground or to be wrecked, the Swedish constitution will be violated, and if the shrewd Cogema agreement is not allowed to continue to milk billions and billions unnecessarily from the pockets of the Swedish electricity bill payers, then international law and world peace will be undermined.

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CEO: 5100/2633

## FINLAND

### IMATRA VOIMA REPORT: NUCLEAR POWER IS BEST OF ALTERNATIVES

Helsinki UUSI SUOMI in Finnish 23 Aug 83 p 3

[Text] According to reports prepared by the Imatran Voima Oy (IVO) [Imatra Power Company], nuclear power is to be regarded as the best basic solution to the power problem, as IVO general manager Kalevi Numminen said when he submitted the results of a comparative study of basic power plant alternatives to Commerce and Industry Minister Seppo Lindblom.

The reports indicate that it is cheaper to produce electricity with nuclear power than with other power plant alternatives. The annual cost would on the average be 369 million markkas less than the coal power plant alternative.

IVO estimates the cost of electricity produced by nuclear power to be 14.5 pennia per kilowatt hour. The next cheapest would be coal power which would cost 17 pennia, not counting the elimination of the sulphur; with sulphur elimination the cost would rise to 19 pennia. With peat power the cost per kilowatt hour would come to 22 pennia.

These estimates are based on the assumption that fuel prices will rise at the rate of 2 percent a year. At this year's fuel prices, according to IVO, we would save 210 million markkas a year with nuclear power.

The power plant alternatives were investigated as feasibility studies and a French nuclear power plant with a gross capacity of 975 Mw, a Soviet nuclear power plant with a gross capacity of 1,000 Mw, two 500-Mw coal power plants and a 250-Mw peat power plant were used as examples.

#### Not Before This Fall

A study of modernized nuclear power plant units of the Loviisa type has also been initiated, but, according to Numminen, the study will not be completed before this fall. This study of two small nuclear power plant alternatives was begun so much later that it could not be completed at the same time as the other comparative study was, since the decision on a small power plant was not up for consideration until last year.

Numminen, however, added that IVO had as early as the mid-1970's calculated an extension for the Loviisa 1 and 2 plants on the basis of two small nuclear

power plants, but it was at that time demonstrated that that would be an economically costly solution.

"Two small ones cost more than one big one. Of course, a solution effected in two stages distributes the funding over a longer period of time and the additional electricity production can be staggered."

IVO does not assume a definite position in the report that has just been completed as to which nuclear power plant alternative, the Soviet or the French, would be more advisable.

"The French and the Soviet power plants are economically and technically at the same level. In economic terms there are no essential differences between them," Numminen replied.

#### No Decision on Imported Electricity

Numminen did not feel that additional electricity, possibly imported from the Soviet Union, would resolve the problem of increasing Finland's electricity production capacity.

At present 600 Mw of electricity are imported from the Soviet Union and the current agreement will be in effect until 1989. Numminen did not feel that imported electricity's share of the increase in volume would be a technically simple matter and he also said that he would be surprised if it were economically feasible.

"But naturally we are interested in increasing our electricity imports from the Soviet Union," Numminen added.

The IVO power plant report is based on calculations made by the Electricity Producers' Cooperative Commission, which indicate that electric power needs will grow during this decade at an annual rate of 3.8 percent and at a rate of 2 percent during the next decade.

Numminen admits the growth in electricity consumption has slowed down these past few years. But according to Numminen, this study shows that nuclear power will provide a more economical solution in the event that the increase in energy consumption should be essentially slower than assumed in the report.

"If we overproduce, the power industry itself will suffer most. Too much construction would be uneconomical for it and IVO is not working toward that end, but is instead concerned over seeing to it that we will have enough competitively priced electricity."

PAPER CITES FOREIGN POLICY IMPLICATIONS IN NUCLEAR DECISIONS

Helsinki UUSI SUOMI in Finnish 24 Aug 83 p 2

[Editorial: "A Stand Must Be Taken on Nuclear Power"]

[Text] Imatran Voima Oy's (IVO) [Imatra Power Company] recent basic power report has apparently not produced any kind of strong reaction. People are at least temporarily tired of the nuclear power debate.

The IVO studies can probably not be overly characterized as unreliable. Data brought in from different parts of the world tell the same tale: Nuclear power is clearly more economical than other forms of energy. Coal is next best and peat ranks only third. Similar results have been obtained elsewhere as well, for example, in France and England.

The public debate on energy studies has contained much doubt and many emotional counterclaims. It would be well to spell out the rules for the dialogue. No study should any longer be labeled as being one-sided without demonstrating its flaws.

Ongoing reporting on the different alternatives is one of the obligations of our biggest electric power company. This is almost as obvious a fact as Neste's dominant role in matters pertaining to the use of oil and natural gas.

IVO is at the same time also an interested party. It has its own position on the alternatives and its own objectives. It is, therefore, indispensable that research methods and results comparable to the industry's basic study be openly published. It is up to IVO to make open criticism of its reports possible. So far the dialogue on energy alternatives has been more a matter of claims and assertions than factually based exposition.

We cannot be certain of the safety of nuclear power — no more so than we understand how coal power plants affect the environment. It, nevertheless, seems that the world's nuclear power plants have now gone beyond the age of children's diseases. During the past couple of years they have been running well. As for Finland, we can even speak of particularly reliable operational stability.

In such matters seeing farther ahead, tens and even hundreds of years into the future, is impossible. We can no more with certainty assess the possible disadvantages of nuclear power than we can the danger factors other forms of energy pose to the globe. As for the question of nuclear power plant waste, we can hardly at this time supply any other answer but the fact that, technically speaking, sufficiently safe solutions to the problem of storing it have been developed.

The future line of development of basic power must be chosen now, on the basis of the existing facts. The situation is a poor one with respect to the choices. The nuclear power debate is in a blind alley. Furthermore, it has in other ways lost its cutting edge. The government must soon come up with its proposals and ideas if we intend to guide Finland down some purposeful energy policy path. It is pointless — and wrong — to expect a decision on the basis of, for example, trade policy. The energy question is an independent part of our socioeconomic policy.

The choice of an economic energy alternative — the way things look now, nuclear power — is a matter of international subsistence for Finland. Thus here in the north we must immediately make use of that part of the new technology that can be quickly and easily adapted to our needs. Nuclear power is not an alternative without risk, but it is getting to be the safest one in terms of environmental protection as well.

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CSO: 5100/2635

# WASTE FROM LOVIISA NUCLEAR PLANT TO BE BURIED UNDER ISLE

Helsinki HELSINGIN SANOMAT in Finnish 31 May 83 p 7

[Article: "Nuclear Waste Storage to be Located Under Hastholmen Isle: The City of Loviisa Defended the Use Permit for Number Two"]

[Text] At the meeting of the municipal board on Monday, the city of Loviisa approved medium and low radioactive waste to be buried within the city limits. The municipal board made a basic decision on the issue at the same time it voted to make the operating permit of the second Loviisa unit permanent.

The most active medium and low radioactive wastes remain hazardous to the environment for 500 years. The city requires that the final burial site will be constructed on the premises of the power plant, on the isle of Hastholmen, and not under the sea. The final burial site must not cause any extension of the restrictions regarding the use of the land in the plant's neighborhood. The city requires that the supervising authorities consider that a sufficient safety has been achieved.

The municipal board of Loviisa decided to support the issue of a permanent operating permit for the second unit, providing that the supervision of radioactive leakages will still be handled by the institute of radioactive safety.

The city of Loviisa was consulted, as were several other authorities, in connection with a round of statements conducted by the Ministry of Trade and Industry.

It is still possible, till August 7, to present information and opinions about this matter, in case it "might have considerable impact on living, working or other conditions," says the Ministry of Trade and Industry.

The Ministry of Trade and Industry asked in its statement request that attention should be paid to the environmental impacts of the operation of the second Loviisa unit up until now and in the future. Furthermore, attention should be paid to the environmental impacts of the operation of the second Loviisa unit up until now and in the future. Furthermore, attention should be paid to the eventual consequences to the city of Loviisa if the permit would not be renewed, as well as to the plans regarding the final burial site to be located within the city limits.

In the statement submitted by the city of Loviisa, it was stated that the second unit has functioned well and that the radioactive leakages have been minimal compared to the ratings. It has been determined that the cooling water weakens the surrounding ice, but this fact is already known, and Imatran Voima is following the thickness of the ice.

As for the fishing conditions, the city of Loviisa says that sports fishermen have brought good news about an increase in salmon.

If the operating permit for the second Loviisa unit was not approved, it would have harmful consequences to Loviisa and to the entire Eastern Uusimaa, according to the city of Loviisa. The area's tax incomes would decline considerably, the employment situation would get worse, and the development in the service sector would slow down.

As the municipal board ended up approving the final burial site of nuclear waste, it stated on its agenda that the site will be 100 meters under ground. By means of drilling, it has been found out that in the rock there is water which is approximately 10,000 years old, in other words, the water flow is very minimal within the rock.

On the agenda the following items are documented as nuclear waste: "solidified liquids, which have been cast into concrete, service waste pressed into containers, radioactive machinery parts placed into concrete coffers and waste formed during disassembly of the plant."

The processing of the application for the operating permit of the second Loviisa unit is based on the request by Imatran Voima to the Ministry of Trade and Industry in which it requested it be permitted to continue to use the power plant after the end of this year. The processing is based on the nuclear energy law originating from 1957.

The inhabitants of Loviisa who are critical of the nuclear power plant have been surprised that such an important, fundamental issue, as where to bury nuclear waste, could be handled on the municipal board level in the city. The municipal council was not consulted in this matter.

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CSO: 5100/26:2

## FINLAND

### BRIEF

**LOVIISA PLANT GRANTED LICENSE**—The provincial government of Uusimaa has proposed that a license to operate be granted Imatran Voima's [Imatra Power Company] number-two nuclear power plant, but only for a stipulated period of time. The current license will be in effect until the end of this year. According to the provincial government, the rescue service plan for the Loviisa area is inadequate and behind the times. For example, in the event of nuclear power plant accidents leadership responsibility and the power to act are inadequately organized. The provincial government does not at the present time have the personnel required by the plan for conducting rescue operations. According to the provincial government, there is no place either from which rescue operations could under any circumstances be initiated without delay. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 27 Aug 83 p 9] 11466

**NUCLEAR DISTRICT HEATING FORESEEN**--In the future, a combined production of electricity and heating will be a form of production for economical district heating. So far experts on district heating are cautious about estimating the absolute energy alternative for the future, but at present the strongest alternative discussed is nuclear heating power. According to General Manager Veli Rautoja from the Electricity Producers' Association, it is probable that at the end of the century, condensated heat from the nuclear power plants will be utilized as a source for district heating. Regional district heating systems and problems related to them are being discussed in Lahti at the conference of Unichal, a joint organization of West European countries in the field of district heating. At present coal is, without any doubt, the most economical energy source used by the district heating plants under Finnish circumstances. According to Veli Rautoja the position of coal seems to be very stable, for especially in the Baltic countries it is a question of buyers' market at present. Coal is also the most likely alternative in the discussions concerning the energy options for the heating power plant to be constructed in the metropolitan area, says Rautoja. [Excerpt] [Helsinki HELSINGIN SANOMAT in Finnish 7 Jun 83 p 26] 12190

CSO: 5100/2612

## CASTAING ON REPROCESSING STATUS, PLANS; WASTE STORAGE

Paris REVOLUTION in French 27 May 83 pp 57-61

[Interview with Professor Raymond Castaing, chairman of Working Group on Irradiated Fuel Management, by Helene Guillemot, Jean-Yves Guezennec, and Pierre Vitorge: "Nuclear Waste: a Technically Solvable Problem"; date and place not specified]

[Text] The Working Group on Irradiated Fuel Management--more commonly known as the Castaing Commission--was formed in October 1981 upon government request following the parliamentary debate on energy. After a year of assiduous work, the group--composed of distinguished scientists of highly varied views on nuclear questions--unanimously approved a report on the current status of reprocessing and on conceivable improvements or alternatives thereto. In a second report released last April, the group examined the waste management program proposed by the Atomic Energy Commission (CEA). Every one has chosen to see confirmation of his own personal views in these two reports. In the following interview by REVOLUTION, Professor Raymond Castaing, chairman of the working group, discusses the current status and future prospects of nuclear waste reprocessing, an industry whose consequences will extend for thousands of years to come.

[Question] Despite the diverse views of commission members--including well-known antinuclear activists, key CEA officials, etc.--the two reports were adopted unanimously. Such consensus is quite remarkable. Yet everyone--trade unions, etc.--has expressed satisfaction at the fact that the commission had decided in their favor...

[Answer] That is correct. But, nevertheless, I should like to make a distinction between the two reports. The first report, prepared after a year of deliberations, dealt with the management of irradiated reactor fuel in general. Its opinion about certain aspects of current fuel management in France was favorable. It did express some criticism, however, about other aspects. The second report was designed to furnish data for use by the Senior Council on Nuclear Safety in formulating its official opinion on a plan proposed by the CEA, a plan dealing primarily with those points about which we

had expressed some reservations in our first report, namely long-term storage. Because of this, the second report thus contained more criticism and less favorable opinions. Hence it can be said that the consensus for this second report was undoubtedly not as complete as for the first report.

To prepare the first report, our group had held 45 4-hour meetings in the period of 1 year, not to mention numerous other consultations, work by experts, etc. And when persons get together and discuss matters in this way for more than 200 hours, each one ultimately comes to understand the position of all the others. This is a very lengthy method which demands a great deal of work. But it is the proper method. Of course, the fact that all members signed the report does not mean that every one of them held identically the same position after our discussions. But all signatories did agree to endorse the conclusions, remarks, and recommendations of the second report as they had done for the first report.

There is no doubt that every one tends to draw from these reports solely what suits him and pleases him. We believe, however, that both reports must be considered in their entirety, as a whole. For instance, although we found that the reprocessing plants are capable of reprocessing irradiated reactor fuel under highly satisfactory conditions, we also recommended that France study methods of storing nonreprocessed fuels.

The capacity of our present reprocessing facilities is such that if we build additional nuclear power plants in the 1990's, their fuel will not be reprocessable in those facilities. In that case, we would have to either build more reprocessing plants or resort to direct storage. In any case, however, France must be prepared to manage these thousands of tons of irradiated fuel.

[Question] France is one of the world leaders in methods and techniques for reprocessing irradiated reactor fuel. But other countries have opted for a policy of no-reprocessing...

[Answer] There are two conceivable ways of managing irradiated fuels. They may be stored as such, in other words without reprocessing them. The spent fuel is sealed in a container designed to remain intact as long as possible. The container is then buried so that even when it corrodes or disintegrates within several thousand years or hundreds of thousands of years, the geochemical barriers installed and the rock formations chosen will prevent any subsisting dangerous elements from escaping and coming into contact with the biosphere. This storage method has been studied in several countries, notably in Sweden, but there is still no assurance of its long-term safety. A second method has been studied, designed, and applied in France. It consists of reprocessing the fuel by extracting radioactive substances and materials therefrom. First of all, there are the fission products with a very high total concentration of radioactivity but a relatively short half-life.\* Hence even though fission

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\* A substance is said to be radioactive if it disintegrates spontaneously while emitting radiations (called alpha, beta, and gamma). The half-life of a radioactive substance is the time required for one-half of the substance's atoms and mass to disintegrate (decay). For example, plutonium has a half-life of 24,000 years. This means that a kilogram of plutonium will be reduced to 500 grams in 24,000 years, 250 grams in 48,000 years, etc.

products have a radioactivity of several million curies\* per ton of fuel upon removal from the reactor, this radioactivity will have practically disappeared in a few centuries. On the other hand, irradiated fuel also contains other substances that are less radioactive but have a much longer half-life. These include, for example, plutonium -239 with a half-life of 24,000 years and neptunium -237 with a half-life of 2 million years.

These latter elements create much more difficult problems. While it may be possible to find containers that completely seal and isolate environmental products for a few dozen centuries, it would perhaps be somewhat optimistic to expect to develop containers that can remain intact and effective for more than a million years!

Thus one solution to the nuclear waste problem consists in treating irradiated reactor fuels for the purpose of recovering the uranium and almost all of the plutonium for possible subsequent reuse, and also for the purpose of removing other radioactive substances that will be buried--as in the case of no-reprocessing, but with a much lesser amount of plutonium remaining in the stored waste--deep inside geological formations that can retain the waste once containers reach the end of their useful life, and thus prevent it from spreading into areas where it could be injurious to man. France has developed a process for vitrifying high-level waste. This is an excellent short-term and intermediate-term solution (even though the intermediate-term in this case covers some 1,000 years!). This solid, glass-like form of waste contains not only fission products but also certain very long-lived elements such as neptunium, for example. This vitrification process provides an excellent assurance of safety for some dozen centuries. This is enough time to permit fission products to lose all their radioactive strength. Still to be determined, however, is whether this process continues to be safe after several thousand years.

France adopted the reprocessing method for two reasons. First, this process makes it possible to recover unburned fuel like uranium-235 and plutonium from spent fuel elements. This recovered fuel can then be used in light-water reactors or in fast breeder reactors.

Secondly, France considered that separation of almost all of the plutonium was a safer solution than storing irradiated fuel elements in their entirety deep underground.

It must be realized, however, that choice of the reprocessing method does not mean that the sole problem is one of very high-level wastes. There are also intermediate-level and low-level products having a short half-life, but containing an extremely small quantity of long-lived alpha emitters. This latter type of waste can be stored in engineered surface facilities or in shallow land-burial sites and kept under continued surveillance for 3 centuries. By then, almost all of the short-lived beta and gamma radioactivity will have

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\* The curie (Ci) is a unit corresponding to the radioactivity associated with 1 gram of radium, i.e. 37 billion atomic disintegrations per second.

disappeared. The only remaining radioactivity will be from the low-level (long-lived) alpha emitters contained in these products. Waste from properly functioning reactors belong to this class of waste and contain practically no alpha emitters. Hence the problem for such waste is solved by storage under surveillance for 300 years. Between this low-level waste--called "type A"--which can be placed in surface storage and the high-level waste--called "type C"--there is a third class--"type B"--consisting of both low-level and intermediate-level products but containing a larger quantity of long-lived emitters. The solution for this type B waste is deep underground storage after having suitably processed and packaged such waste. In our first report, we expressed some reservations about the very long-term safety of the processing and packaging methods proposed for this type B waste.

[Question] The commission you headed was charged with the task of evaluating France's present fuel reprocessing plants and submitting its suggestions for the future. What are your principal observations, criticisms, and proposals?

[Answer] Our group found that the present plants are capable of reprocessing at their designed capacity and are operating under safety conditions satisfactory for both personnel and the environment. The radioactive content of discharges from the plants is much below the level deemed acceptable without appreciable danger to human populations. As for the waste storage methods employed, we indeed found them to be very safe for both the short-term and intermediate-term. But we did, as I mentioned earlier, express some reservations about the validity of these methods after a few centuries because of the presence of long-lived radioactive substances--like neptunium and plutonium--contained in the high-level or intermediate-level waste. For this reason, in its first report our group recommended that no irreversible action be taken. We advised against placing anything--bituminized or vitrified waste--in final deep underground storage, so as to retain the possibility of retrieving temporarily stored waste for the purpose of either repackaging it or possibly more completely reprocessing it, thus converting it into products more suitable for permanent storage. Waste products currently solidified into a vitrified form similar to glass constitute no danger for centuries, but before irrevocably storing such waste deep underground in geological formations, it would be appropriate to conduct a detailed analysis of these formations by means of drilling operations and even by building underground laboratories in which experts could study the effects of the release of heat generated by highly radioactive waste, and also in which experts would seek to predict changes in the man-made barriers, the migration of radioactive products after these barriers deteriorate, and their absorption in the rock formation whose role is to prevent such products from escaping and returning to the surface. In short, while there is no pressing need to store waste, there is a pressing need to begin this huge task of geological and physicochemical research. It is solely with cognizance of the results of such research that we can determine whether deep underground storage is altogether safe.

We also consider it necessary to open one or more surface storage centers. The present center is already quite full. Here also there is a pressing need to study and clearly define the criteria governing establishment of such a storage site designed for waste that will have to be monitored for some 300 years: a study of the site's impermeability, hydrogeographic system,

groundwater sources, etc. Geologists and scientists must establish a set of criteria within a sound framework of safety rules and regulations. Based on these criteria and safety considerations, a search for favorable sites must then be conducted along with a detailed analysis of each site. Construction of the storage site or sites can begin only after completion of all these studies. Furthermore, it is essential, in our commission's opinion, that all of these operations be given full public disclosure. In fact, we broadly underscored this requirement in our two reports: the public has to be informed as comprehensively and accurately as possible about everything related to nuclear safety. Each citizen should be able to make up his own mind on the basis of such public disclosure. This is an absolutely necessary precondition of public acceptance of nuclear power.

Even though construction of surface storage centers is an extremely complicated issue, the ideal situation would be for a citizen, a mayor, an official of a commune adjacent to the center to have the possibility of arriving at an accurate and quantitative appraisal of the safety of the storage site, if need be by obtaining help from scientists of his acquaintance (lycee teachers, for example). Maximum allowable radiation dose rates in the vicinity of reprocessing plants are extremely low. The rates for surface stored waste recommended in our second report are equally low. We recommend that they not exceed 100 millirems\* per year for the chronic exposure of future persons who might unwittingly establish themselves on the storage site. This dose rate is on a par with the natural radiation given off by cosmic rays and the Earth. It is much lower than the natural radioactivity to which some inhabitants of granitic regions are exposed. As a comparison, the toxicity--as a carcinogen--of a single cigarette can be estimated to be equivalent to a radiation dose of a few millirems. The proposed radiation dose rate would, therefore, be no more harmful than one package of cigarettes per year. Furthermore, it should be noted that persons currently living in the vicinity of a nuclear power plant are exposed to less than a few dozen millirems per year. Yet even though safety is completely assured close to waste storage centers, even though persons incur more risks in smoking a package of cigarettes per week than by living close to a nuclear power plant, it is, nevertheless, necessary to ensure that the actions we take at the present time do not entail greater risks for future generations. We deemed it our moral obligation to provide our descendants in the distant future with the same degree of protection we currently give our people.

[Question] One can't help thinking about other types of hazardous waste that are no doubt less effectively monitored and have been the topic of recent disclosures...

[Answer] I agree. The precautions taken with nuclear waste are tremendous in comparison with what appears to be the case for other types of waste which our group was not instructed to examine. Although chemical waste is more dangerous, it is apparently subject to a great deal less surveillance. The public worries more about nuclear waste partly because of the extraordinary

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\* The rem is the unit used to measure the biological effectiveness of nuclear radiation.

persistence of some of these wastes. But people have to realize that what persists even longer than long-lived radioactive waste is nonradioactive waste which, unlike the former, has an infinite lifetime! Admittedly toxic waste in this form can be destroyed. But when such waste is toxic in atomic form, it poses serious problems. Nevertheless, inasmuch as people are afraid of nuclear power, the nuclear power industry is duty bound to set an example by extremely rigorous management of the pollution it generates. This does not mean that other types of pollution are to be neglected. In fact, in our report we emphasized the fact that all polluting industries ought to follow the example set by the nuclear power industry.

[Question] Earlier you mentioned the possibility of retrieving stored waste, of developing more advanced fuel reprocessing techniques.

[Answer] Indeed that is one of our group's recommendations. Research must be continued and intensified in an effort to find an overall solution conducive to complete settlement of the waste problem. One conceivable technique--already achieved under laboratory conditions--is the chemical extraction of all long-lived elements and their separation from fission products having a relatively short half-life. At the present time, americium and neptunium--whose potential harmful effects extend over several hundreds of thousands of years--are being encapsulated in a vitrified form similar to glass wherein they are mixed with highly radioactive but short-lived fission products. Solely the short-lived products could conceivably be left in the vitrified form and, therefore, would no longer be harmful between now and a few centuries hence, and could be kept under surveillance until then. Yet there is still the problem of what to do then with the long-lived substances once they have been separated. Well these can be destroyed by "incineration." This does not mean burning them like household garbage and trash. It means actually transmuting them by neutron bombardment inside light-water reactors or fast breeder reactors; in other words, transforming them into short-lived elements that could then be placed in surface storage and monitored during their decay phase. In this way, by the end of the nuclear era only a relatively negligible residue of long-lived elements would still subsist. This truly attractive solution demands very thorough study because chemical extraction of long-lived elements is complicated and industrialization of the process could take several decades. Nevertheless, it is a conceivable solution provided sufficient research and development is devoted thereto.

[Question] In addition to industrializing the separation of alpha emitters--a process already achieved in the laboratory, as you have just mentioned--must we not also expand the field of research to include the testing of other (chemical) separation processes?

[Answer] Yes indeed, it would be advantageous not only to improve existing processes but also to continue studying others. In our report, for example, we mentioned "dry" reprocessing. It must be understood, however, that all of this costs money.

I should like to advance still another argument in favor of separating long-lived products. If we extract the neptunium and americium, the vitrified waste will

contain practically only short-lived products. So much so that at the end of 1,000 years we would find therein, per ton of irradiated fuel, 1 or 2 kilograms of such rare and strategic elements as rhodium, palladium, and technetium, not to mention rare earth elements. Provided we do not permanently bury this vitrified waste deep underground but store it on the surface or in the subsurface--a method I would personally approve--it will eventually contain veritable ores, tens of tons of very precious elements that may be of interest to our descendants. Don't you think it would be more agreeable for future generations to be left a positive legacy instead of polluting wastes?

We still have the problem of plutonium which will either be used as fuel for fast breeder reactors or have to be stored if we do not build such reactors. Nobody can reasonably consider placing it in orbit around the sun, as some have actually suggested. One ton of irradiated fuel produces 8 kilograms of plutonium. But it is obviously easier to package and encapsulate a single element within a suitable matrix than to enclose a mix of highly varied products therein.

Hence if we do not build fast breeder reactors, we can store plutonium in the form of extremely stable calcined oxide. By thus separating the products, such a method of "very intensive reprocessing" permits us to foresee the possibility of tailoring a conditioning and packaging process to each of the products. This would be an excellent solution provided it is accompanied by improvements throughout all of the reprocessing operations, improvements designed to reduce to a minimum the alpha emitters--hence long-lived radioactivity--contained in type B wastes and also in wastes stored on the surface. Our group considered that in the present state of the art only intensive reprocessing, achieved with all necessary improvements for all types of waste, could be justified solely from a safety standpoint, independently of the possibility it offers of producing plutonium usable in an eventual fast reactor system.

There is a tendency to call nuclear waste an unsolvable problem. I heard such a view expressed again on television recently. The truth of the matter is that the problem is not unsolvable. It's a question of research, development, and in the final analysis, money.

[Question] How did your group prepare and formulate its proposals on the safety of storage sites?

[Answer] In our second report, we took special interest in the problems created by surface storage. The management program proposed by the CEA adopted as its guiding principle the closing of surface storage sites after a 300-year surveillance phase, and declaring the land thereon to be reclaimed and fit for public use. This implies that the concentration of long-lived emitters in the waste is low enough to be of no danger to persons settling on the site after its closing and unaware of its former use. But the CEA proposal did not clearly specify what this maximum limit of "alpha radioactivity" content should be for waste to be placed in surface storage sites. It was our opinion that prior to establishing such sites, the safety authorities categorically had to determine and promulgate rules and regulations governing this content limit.

Our opinion led us to conceive different scenarios in our second report. These were deliberately pessimistic as is normal when studying the dangerous consequences of any activity. But they were not ridiculously pessimistic. For example, we did not consider a volcano erupting or a meteorite falling on the storage site because this would be an accident with a probability of practically zero. The consequences we considered were, of course, in the far distant future. We could evidently assume that men of the future will have made great advances and that it would be useless for us to wish to protect them from dangers they will control much better than we do. We felt, however, that we could not base our analysis on such assumptions. That is why we applied to future generations the same safety standards used today, namely a maximum allowable radiation dose rate of 100 millirems, a truly very low limit.

We then developed several scenarios including the following: workers building a superhighway over a former surface storage site--without being aware of its existence--and removing earth containing a very small amount of plutonium or other alpha emitters; or else a former storage site having been bulldozed for construction of a suburban housing development, with children playing on land consisting partly of former nuclear waste. By using such data as, for example, the grain analysis (granulometry) of dust, we then calculated the allowable concentration of long-lived emitters ensuring that persons of the future are never exposed to more than 100 millirems. According to our calculations, that concentration must not exceed one-hundredth of a curie per ton on the average throughout the storage site. With this very low concentration, we are assured that our descendants will incur no significant risk by living on former storage sites that have been graded, leveled, or cleared with a bulldozer. I repeat that this is a pessimistic scenario but not a ridiculous one.

We also urged the scientific community to take a greater interest in these matters. Scientific interest groups could be formed with, for example, the CEA, CNRS [National Center for Scientific Research], and BRGM (Bureau of Geological and Mining Exploration). Such groups would study the evolution of materials, transuranium elements, etc. It is not wise to limit these studies to but a handful of experts. On the contrary, a great many scientists should become involved.

In order to better protect future generations, we must, of course, not run the risk of irradiating contemporary populations. In any case, the risks incurred at the present time have to be minimized by means of shielding, automation, etc. In this category of problems, there comes a time when an "optimization study" is a must. We have requested that if such a study is made it be released to the public.

[Question] When visiting the fuel reprocessing plants did commission members meet with workers in addition to management personnel?

[Answer] Yes they did. The entire group visited the La Hague plant where we talked to workers and held a meeting with the trade unions. The workers explained their problems. They told us, among other things, that they wanted to have a greater say in all safety-related measures. They suggested a certain number of ways to reduce irradiations, suggestions that can lead to

considerable improvements. Maximum consideration must definitely be given to recommendations made by rank-and-file workers who are daily confronted with concrete problems.

[Question] Earlier you mentioned the policy of storing irradiated fuel without reprocessing it. This approach is incompatible with the use of fast breeder reactors. What do you think of such a practice?

[Answer] It is obvious that if we do not reprocess there will be no plutonium for fast breeder reactors. On the other hand, there is no excluding the possibility that storage of nonreprocessed fuel can fully ensure long-term safety. But this has still not been proven, no more, indeed, than the long-term safety of vitrified waste. The no-reprocessing option does have its supporters. Some Swedish metallurgists believe it is possible to fabricate copper encapsulating materials resistant to corrosion for a million years. This does seem amazing, but after all it is not wholly inconceivable. Yet, if I may give you my personal opinion on this point, even if fuels can be stored with complete safety without reprocessing, this approach is not really satisfactory. As I see it, this would betray the failure of an industrial society that does not know how to get rid of the wastes it produces. So it "dumps" them by storing them deep underground. Even if no-reprocessing is non-hazardous, a more correct solution would consist in destroying all waste, transforming it into short-lived elements so that all of it ultimately reverts as close as possible to its original state. And along this same line, I personally find that the fast breeder reactor has the advantage of making more efficient use of natural resources by making it unnecessary to draw on our uranium reserves. Apart from any technical, economic, or safety considerations, intellectually I would, therefore, favor the fast breeder reactor because of its concept of operation. To develop such a reactor, however, reprocessing techniques have to be fully mastered because fuel is continually recycled under this concept. In addition, the reactor's safety has to be thoroughly studied and its costs analyzed to determine whether they are acceptable.

[Question] Improving present reprocessing methods and finding new more effective methods would require a major research effort. Is allocation of the necessary financial resources for such an effort conceivable at the present time?

[Answer] All of this particular type of research is conducted by the CEA within its overall research budget. An increased research effort on reprocessing should not, for example, penalize basic research. The CEA might possibly fear being told: "Increase your research efforts, but we are not giving you one cent."

New forms of financing could be found. The Swedes, for instance, have begun placing money into an account to cover storage expenses in future years. Another possibility would be a special tax. It has been calculated that an increase of 2 to 3 centimes in the price per kilowatt-hour of power would very likely be enough to cover the cost of gradually replacing all existing standard power reactors with fast breeder reactors. Such replacement is based on the current level of electric-power generation and on the assumption that technical and safety problems associated with fast breeder reactors are resolved.

[Question] Don't you think a major research and development effort to improve reprocessing is conceivable only within a context of economic growth?

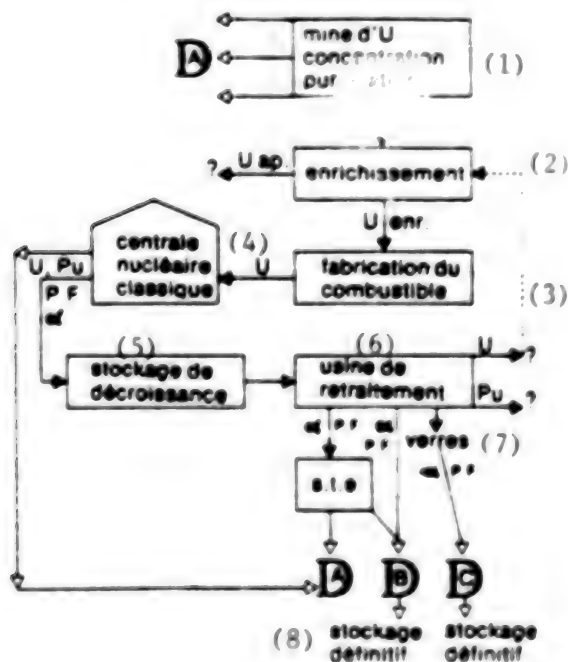
[Answer] I would not describe the situation in those terms. During the past few decades, the technical and economic upswing was such that nondurable consumer goods were manufactured so that they would last but a short time, thus compelling people to replace them frequently and thereby keep factories running.

In my opinion, the objective of technological improvements today could be, on the contrary, to produce differently, in a nonpolluting manner and with maximum recovery of raw materials: manufacturing more efficiently, obtaining better quality, and generating less waste. I do not refer solely to nuclear wastes which make up but a small part of all industrial wastes. In my view, the big concern for industrial nations in the 21st century could be to produce better by ceasing to waste the Earth's resources and by reducing man's impact on the environment to a minimum.

[Question] Such nonpolluting solutions and the research required to find them are highly energy-consuming. And they do after all imply a level of economic growth allowing a surplus of our national production to be allotted to them. Experience shows that in a period of recession, one of the first things done is to cut the budget for long-range research.

[Answer] In any case, it is better to have people work on techniques for the future than to keep unemployment high. Research on new solutions--an effort that should also concern other polluting industries--does cost money, and above all it requires a great deal of work. But the object of such research is to conserve limited-quantity resources and safeguard man and the environment. France has capably prepared and implemented a sound nuclear power program. Consequently France must--and this is to some extent the idea that guided our group--play a leading role in developing exemplary solutions to the problem of irradiated fuel management.

Simplified Diagram of Current Fuel Cycle



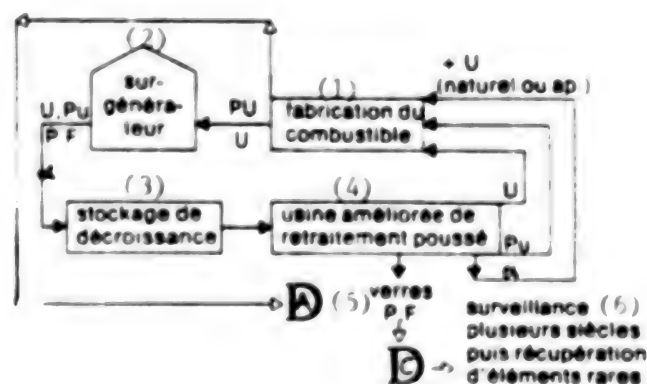
## NOTES

- a. A, B, and C: Type A, B, and C wastes; A: low-level concentration of radioactivity, B: intermediate-level, and C: high-level.
- b. Type A wastes have a sufficiently low-level of alpha activity to be handled routinely according to accepted norms (see maintenance).
- c. The principal elements containing alpha emitters (long-lived: several thousand years at least) are: uranium (U), neptunium (N), americium (Am), and curium (C).
- d. PF: fission products (short half-life of a few dozen years).
- e. STE: effluent treatment station; its function is to purify liquid waste to permit their further processing and disposal.
- f. U enr: enriched uranium; U ap: depleted uranium.

## KEY:

1. Uranium mining, milling, and refining
2. Enrichment
3. Fuel element fabrication
4. Standard nuclear power plant
5. Decay cooling
6. Reprocessing plant
7. Vitrified waste
8. Final storage

## Example of Improved Fuel Cycle



Improvements are mainly of three categories:

- a. Reprocessing plant improvements designed to eliminate the plant's intermediate-level wastes.

b. Development of intensified reprocessing to recycle alpha emitters and thus avoid their final storage.

c. Industrialization of fast breeder reactors for the purpose of closing the fuel cycle.

KEY:

1. Fuel element fabrication
2. Fast breeder reactor
3. Decay cooling
4. Improved intensified reprocessing plant
5. Vitrified waste
6. Surveillance for several centuries and then recovery of rare elements

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CSO: 5100/2636

## PORTUGAL

### LOCATIONS FOR NUCLEAR PLANTS UNDER STUDY

#### Locations Listed

Lisbon EXPRESSO in Portuguese 13 Aug 83 p 1

[Text] Freixo de Espada a Cinta, Mertola, Mira and Vila Nova de Milfonte were the four localities indicated in a report by a group of researchers from the Directorate General of Energy concerning the future construction of four nuclear generating plants anticipated in the National Energy Plan. Established by order of Baiao Horta, former energy minister, within the scope of the National Energy Plan, the above-mentioned group analyzed the various sites where the always-unwanted energy-producing units might be installed and concluded by choosing the four indicated localities. It should be emphasized that Baiao Horta has several times declared that this work is fundamental for a definitive nuclear option.

The localization study was based on the criteria of the International Agency for Atomic Energy and on the guidelines of the national agencies of the United States and France in addition to the integration of "synthesis-principles" adapted to Portugal. The proximity of an abundant source of water, the allowance of proper distance relative to urban centers with more than 100,000 inhabitants and the absence of seismic faults were the essential conditions guiding the choice of the study group.

Thus, other previously considered regions were discarded, specifically Vila Velha de Rodo and Ferrel, located on seismic faults and a locality in the area of Mafra due to its proximity to Lisbon. Sines also was abandoned in favor of Vila Nova de Milfontes due to the importance of the industrial complex already constructed in that Alentejo town, a situation that also makes inadvisable the construction of this type of unit.

With regard to the four localities chosen, it should be mentioned that the one most opposed from the beginning has been Mira, a beach a little to the north of Figueira da Foz. In fact, the population density of this area is relatively low.

Freixo de Espada a Cinta and Mertola are towns situated close to two international rivers--the Douro and the Guadiana--next to which the Spaniards already have two other nuclear plants under construction.

Vila Nova de Milfontes is one of the most beautiful beaches of the Alentejo, located at the mouth of the Mira River, considered to be one of the least polluted in Europe.

#### Local Governments Protest

Lisbon DIARIO DE LISBOA in Portuguese 18 Aug 83 p 9

[Text] The municipal councils of Mira, Freixo de Espada a Cinta, Mertola and Vila Nova de Milfontes do not want to become the garbage cans of the nuclear option and have already shown their opposition to the construction of nuclear energy plants in the areas of their respective jurisdictions.

The municipal leaders were taken by surprise by the news divulged last Saturday in the weekly EXPRESSO, in which those four localities were named as the sites chosen for the future construction of four nuclear generating plants anticipated in the National Energy Plan, within the scope of a work by the Directorate General of Energy on the subject.

A source in that directorate general, quoted by an afternoon paper in Lisbon in its 17 August edition, has "brought the water to a boil" by declaring that the study for emplacing four nuclear generating plants has still not produced a final document, for which reason there is still no choice as far as specific locations are concerned.

"It is one thing to anticipate sites for the nuclear generators and something else to make the political decision and develop the capability of constructing them," he said.

However it may be, the councils in question have lost no time and have already unequivocally shown their opposition to the construction of those units in the areas of their respective councils.

#### Construction near Guadiana Opposed

Meeting yesterday in a special session, the Mertola Municipal Council unanimously rejected the eventual construction of a nuclear plant in their area. The council members considered that the plants "constitute a very serious threat to our natural patrimony and to the lives of all of us," insisting on the necessity of "solving instead of aggravating" the pollution problems of the Guadiana River.

"The progress desired by the Mertola Municipal Council and the Alentejo in general depends on supporting development of the potentials for which they have a natural vocation and not on destroying potentials by transferring undesirable activities rejected by others because of the high risks they involve," the final approved document reads.

The same position has been defended and approved by the Municipal Council of Odemira, which considers that such a measure, if carried out, "would ruin the entire economy under the jurisdiction of this council, based on tourism, agriculture and fishing."

#### Government Asked for Explanations

The Council of Mira, which meets today in special session to evaluate the problem and take a position, has already announced that it will ask the government for more complete clarification. That has not kept Council President Joao Domingos Cupido from showing surprise over the fact that "they come to offer us something we didn't ask for and about which we were never consulted."

He further emphasized that the reason invoked for the choice of Mira--its proximity to an abundant source of water--did not make sense, since "here, they only go to the sea for water."

Finally, in Freixo de Espada a Cinta, the surprise was absolute:

"Formerly we were busy fighting against the construction of the Sayago nuclear plant and now we get another one wrapped in the national flag," says the council president, quoted yesterday by a Lisbon afternoon paper.

That official would show further surprise at the fact that the region is being considered as the site for a power plant and the respective municipality was the last to hear of it. The Council of Freixo de Espada a Cinta, like the Mira Council, also decided to ask explanations of the government.

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**DATE FILMED**

28 Sept 1983